

SEQUENCE LISTING

<110> PAPES, Fabio
 GERHARDT, Isabel Rodrigues
 ARRUDA, Paulo

<120> CAMBIUM/XYLEM-PREFERRED PROMOTERS AND USES THEREOF

<130> ALEL 202.1 PCT

<140>

<141>

<150> US 60/560,227

<151> 2004-04-06

<160> 41

<170> PatentIn version 3.2

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<211> LENGTH: 3035

<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(3035)

<223> OTHER INFORMATION: Sucrose synthase (SUSY) promoter

<400> SEQUENCE: 1

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<222> LOCATION: (1)...(2513)

<223> OTHER INFORMATION: alpha-tubulin (TUB) promoter

<400> SEQUENCE: 2

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<222> LOCATION: (1)...(2041)

<223> OTHER INFORMATION: Arabinogalactan protein (ARAB) promoter

<400> SEQUENCE: 3

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<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(2422)

<223> OTHER INFORMATION: Caffeic acid 3-O-methyltransferase (COMT) promoter

<400> SEQUENCE: 4

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 <223> OTHER INFORMATION: cinnamyl alcohol dehydrogenase (CAD) promoter
 <400> SEQUENCE: 5

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 <212> TYPE: DNA
 <213> ORGANISM: Populus sp.
 <220> FEATURE:
 <221> NAME/KEY: promoter
 <222> LOCATION: (1)...(984)
 <223> OTHER INFORMATION: cinnamate 4-hydroxylase (C4H) promoter
 <400> SEQUENCE: 6

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 <221> NAME/KEY: promoter
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 <223> OTHER INFORMATION: cinnamoyl CoA reductase (CCR) promoter
 <400> SEQUENCE: 7

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<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 8

<211> LENGTH: 2081

<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(2081)

<223> OTHER INFORMATION: ferulate-5-hydroxylase (F5H) promoter

<400> SEQUENCE: 8

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attaaactat catatttcca gtttaatcaa agatatggaa tctttatttc actaaagata ttattattca 210
taagaatttg atgagttott gcattatttg ttagattatc ttcaccctct tgcaattagt gcttcatgga 280
ctcctttttt tcttggtgaa gtagtttgcc atttaaatat agaaatatct catgctttac aaaatataat 350
aatctccctt aagatataat aaattgaact gagatgcaat taagtcgggt aaaaggcctg gatactgcc 420
gtgaataaga tttacacaaa atattggatt ttttcccgct ctgaaagcta attattgtca gaaaaatacg 490
ttttgaaata gttgattttt attgatattg tggaataaaa acatcaatgg ttccaatgct taaccacgaa 560
aatgacttgt aaaatttata ataaggtcta tttttttcat caagcaataa taataagggt aggcacaaa 630
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attaaaataa tttaaaatat aaaaatacaa aaatattttt taaccacaaa aaaaaaaac tatgaaaatt 1680
aatgttctta aatattgttc tccatccaga ttttggtacg tatgcgttcc cagtgtgtac ttgtttatga 1750
aagtctactc ttatttttca acttttctca agacattgaa ttagtaaaac aatgttttac gaattggata 1820
cgaaaccttc caaaataata tatatatata tatatatata tatatatata tatatatata tatatatata 1890

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tatatatata tatatatata aagaggggagg gaggggggtgg gggagggtcac aaaaaacctg tatataaagc 1960
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 cacaatacaa tacataccat agacacaaac acaaaaatct gcattccatgg a 2081

<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 9

<211> LENGTH: 995

<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(995)

<223> OTHER INFORMATION: sinapyl alcohol dehydrogenase (SAD) promoter

<400> SEQUENCE: 9

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 acccctaata attatatata ataataataa taaaattatt taccattatt tgtctgagat tttttttaat 140
 agaatgatta aaatgatatt gtataaaaaa cctaataata ccatactttt caaataatat tttttactat 210
 tattagtgat tggtttgctg tcaaagttgt tttttttttt ttactatto ttaggagttt gtttctttta 280
 ccctagtcta caggagtttg ttagttacta tcatctcttt aaaaaggaaa ctcatatgga aaaggaaaaa 350
 ttgattaaat acaaaaaaatt ataaaattac atagagtttt tatatttttg aacgattgag ttttaatttta 420
 acttaataaa atataattaa ttacaggtaa aacaagtact tatcaatcat tataagtata ttataaaaca 490
 tattaattat gagttcagca aagatttgtg ctgatttctt gtctcttcta aactacatgt gacaagatag 560
 aaaaaacatc taaatgctaa tgattcttta atatatgact atgcaagtca tttatcttat ttaataacat 630
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 aagaacgact tgctttttta gcgacaatca tgcctccttc gacctaccg atgacaccac ctgtgagtgc 840
 tgtttgccag taacatcacc tccttgctcc tatgtgtata tagaaagaca aacttgccaa gcataaaaaa 910
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<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 10

<211> LENGTH: 1269

<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(1269)

<223> OTHER INFORMATION: UDP-D-glucuronate carboxy-lyase (UDP) promoter

<400> SEQUENCE: 10

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 cagttgtatt gcttcatgga aaataaatat tgtatatatt aggatattta atttgaaata aatattatca 210
 aatatgactc aaaaccagc ctaatatatt tatattttga atatgataca atataaacct ttttagtatt 280
 aacataatgc atgtgttgaa taaatatttt tttttattaa ataataaata tggattgaat gtcgaaaaga 350
 gaaataaata gtgtactcat agttacccca tgtacaagtt gactacaaca acagatgtag tcaaaataaa 420
 agaaaactcg gtctgacgtg tcgttaccat tactgtcatt ggacagtaaa gtctttcgat tgtaacagaa 490
 catgttctcc ttctctctgg ccagtaacga ccgcgaatta cgcttctcgc aaatttcaat ctaacottga 560
 acactatata agtatatgac ctgtctctca tcatccgctg tccttaaato ccttcaaaat actacaacaa 630
 aatatttttt tccctcaatt tatttcagca gcaaaagtct acgtggtaat taaatctcaa tttccattcg 700
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gttctttata taaagctgta gtctttgagt ttcattgactc gcagcgaaaa aagtttgaga ttttgactct 1050
atTTTTTcaC accactcagg tgaactggat ttattatcat gtttttaatt gaaacttggt ggctgggttg 1120
atttaagggt tttgatttgt gggttattta tgaatgtgag gattatgcaa tgttttggtt ctgggttggt 1190
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gatctgata 1269

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<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 11

<211> LENGTH: 1025

<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(1025)

<223> OTHER INFORMATION: lipid transfer protein (LTP) promoter

<400> SEQUENCE: 11

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ggggtaactta agtaataaat aataataata ataatgaatg cottagcatc taaaattcgc tatttttaga 210
agaatcacat tccaagcttc atgaacaatc taatgttcaa tgacatttga tatttttaat aattcaagaa 280
tctcaacaat acaagaatca ttggcatcgc aagatatttt cctaagcaa gctctaaaat ccccgtaaa 350
aacatccttt aaggtatata tattagtctg aaaataatta tgtgttaatc ttcattgtgca gtggtgagta 420
tttcggccat tcaggcgggt gacccgggat cggtcccccag caacggcgctc agttttaatt tttatgtttt 490
cttgaaagtt ttcttaattc ttggcgctgg ctttttggtt ggaaggaaac cggtgttgctg aaaggtaatg 560
gccactaatt gggcaagata atggcatgct tgtgttgctg tagttggctc aaaggggagc tttgtggttg 630
tggtaatatt ggagttctag tcttctagag acccactgag atggctggat aatgagcttc aagggttaat 700
tttgcgctgt cattaaaatg gtaacatctg gatatatgca atggaatggg atgatatggc acccaaatca 770
ccaacctttg attggactgg aaagaactat aatttacaac actaattttc taaagccaag tgctgcaata 840
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atcttgacgt ataaaagctg tccataggag taggagcatt gcattcccat acagcaagaa aatcaatttg 980
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<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 12

<211> LENGTH: 2341

<212> TYPE: DNA

<213> ORGANISM: Populus sp.

<220> FEATURE:

<221> NAME/KEY: promoter

<222> LOCATION: (1)...(2341)

<223> OTHER INFORMATION: ag-13 (AG13) promoter

<400> SEQUENCE: 12

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agatagactt ccactggaac catgcagcat tctcccgta tgacotcatt actcagtcct ttctactggg 210
gtttctgttt caaccttctc ctctgtttca acaggcttct gttcttctt ttcttcttct tctttgggg 280
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aacaggctct acgggtatat cgggtcctc ttttgtctc tcaacaaccg gctctggtgt ttccttaggt 420
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cgaattttca aatatgaaca tccaogaatt aaagatcata attaagatgg aggtgttgat cttgatgtac 840
attccatcag cataaaactt atcagagtta tatatataaa tataattaat gacttgggaag aagtaataga 910

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tgtgctttgt gcagtcggtc atgtaggtga ttatcatcca ttcattgttct caacttgcca ttcgtcatta 1540
acaactctc cctttttttt cttttttttt taaggataaa tgaattaatt ttttaagaaa ataataaaaa 1610
taatttgcata aaaatttttag aaataaaaaa ttccaacaat gctgggtcac taaaattatt aataatattt 1680
aagaaataaa agcaattgac caaaagaact ttcaaaaaaa gctatcttta tttttttttt taatatttct 1750
caatatttgc ttgcactata aactagtact gtgattttct catgttaaat aataataata ataataataa 1820
tcacccttaa ccaataggca taatttactt caaacaagcg aataaaactc tgacgtggaa atttaagttg 1890
gtcccacgct ctctctcggc cattgcttta tcaattatgg tatctcataa aaaatttaaat ttttttttaa 1960
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agcctccaag aacgaaacat tggctacagt ttgaaaactc ttaaaaatgt taagattaat aagattagca 2310
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2341

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<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 13

<211> LENGTH: 31

<212> TYPE: DNA

<213> ORGANISM/SOURCE: synthetic

<221> NAME/KEY: primer/oligonucleotide

<400> SEQUENCE: 13

5'- GCCATAGCTC CTTAAGAGAA ACAGAAAGCA A -3'

<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 14

<211> LENGTH: 32

<212> TYPE: DNA

<213> ORGANISM/SOURCE: synthetic

<221> NAME/KEY: primer/oligonucleotide

<400> SEQUENCE: 14

5'- CAATATAGAA TCAATGAACA GCACTAGTTT GC -3'

<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 15

<211> LENGTH: 20

<212> TYPE: DNA

<213> ORGANISM/SOURCE: synthetic

<221> NAME/KEY: primer/oligonucleotide

<400> SEQUENCE: 15

5'- TCATGTCCTA TCCAACGGCG - 3'

<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 16

<211> LENGTH: 24

<212> TYPE: DNA

<213> ORGANISM/SOURCE: synthetic

<221> NAME/KEY: primer/oligonucleotide

<400> SEQUENCE: 16

5'- CTCATTTTCT CTCAAAGCTC AAAG -3'

<200> SEQUENCE CHARACTERISTICS:

<210> SEQ ID NO 17

<211> LENGTH: 30

<212> TYPE: DNA

<213> ORGANISM/SOURCE: synthetic

<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 17
5'- GACAACTAGT CTAAAGTTAA AACTTAGACC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 18
<211> LENGTH: 20
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 18
5'- CCCTGGAGGT TGGGGTGAGT - 3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 19
<211> LENGTH: 25
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 19
5'- GCGTTCATCT ACAAACCCT CCTCC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 20
<211> LENGTH: 23
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 20
5'- TTCATCCTTA TTTTTTGGG ATA -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 21
<211> LENGTH: 20
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 21
5'- CAAAGGATCA TGGAGTTGGA - 3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 22
<211> LENGTH: 34
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 22
5'- TATACTAATA TGACCTAATA ACTTAGAAGT GTGG -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 23
<211> LENGTH: 22
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 23
5'- CATCTTGATC AAGATTGAAT TC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 24
<211> LENGTH: 20
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 24
5'- CATAATATCA AACTTAAGC - 3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 25
<211> LENGTH: 33
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 25

5'- TGAATTGATG ACGTAGGAAA CATGATAAAC ATG -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 26
<211> LENGTH: 28
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 26
5'- CATTTTCTTG AAACAATGAG GCTAAGAG -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 27
<211> LENGTH: 29
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 27
5'- GACATGAGAA ACTAACGTTG CTTGAATTC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 28
<211> LENGTH: 33
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 28
5'- CATAATATTG GAACTGGTTT CTTGTGTCAGA AAG -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 29
<211> LENGTH: 25
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 29
5'- GCGCTCGGGT TGTACCATA GTTTC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 30
<211> LENGTH: 26
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 30
5'- CATGTTGTTA TATTTAGATA AATGTA -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 31
<211> LENGTH: 29
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 31
5'- TTCATCAAGC AATAATAATA AGGTGAGGC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 32
<211> LENGTH: 26
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 32
5'- CATGGATGCA GATTTTGTG TTTGTG -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 33
<211> LENGTH: 26
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 33
5'- TTCAGTGAAC ATGCTGCCAC AATGAC - 3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 34
<211> LENGTH: 26
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 34
5'- AATCGAAACC GATCGATTG AACTGG -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 35
<211> LENGTH: 21
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 35
5'- CATGGTGCTT GCTTCAGATA G -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 36
<211> LENGTH: 28
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 36
5'- GGAAATGTCA ACACTTGTGT GACCACAC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 37
<211> LENGTH: 23
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 37
5'- GACATTCTTG TCCAATTCT GAA -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 38
<211> LENGTH: 24
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 38
5'- GGAGCTCCA TATTCTGTA TCTC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 39
<211> LENGTH: 28
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 39
5'- CAAGACGATG AAATGAAGAA CTGATAGC -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 40
<211> LENGTH: 26
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 40
5'- GACATTCCTT GACTTAATAT GATGCT -3'

<200> SEQUENCE CHARACTERISTICS:
<210> SEQ ID NO 41
<211> LENGTH: 26
<212> TYPE: DNA
<213> ORGANISM/SOURCE: synthetic
<221> NAME/KEY: primer/oligonucleotide
<400> SEQUENCE: 41
5'- GAATTCGCAT CCATGCGGTG AGTTCTG -3'